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CONTACT DUPLICATING AND RESEAU PRINTER

AND

HIGH RESOLUTION STEP AND REPEAT PRINTER

FOURTEENTH MONTHLY LETTER REPORT

September 10, 1965

Period: August 1, 1965 to September 1, 1965



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NGA Review Complete

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1.0 CONTACT DUPLICATING AND RESEAU PRINTER

1.1 Purpose

The over-all objective of the current contract is the design, fabrication, test and delivery in fifteen months of a Photographic, Step and Repeat, Contact Duplicating and Reseau Printer. Prime design goals are high-speed automatic operation, variable format capability, and high resolution with minimum film distortion of damage. The delivered equipment will be suitable for operational use. The printer will accommodate films of 70 mm to 9-1/2" width with frame lengths up to 30 inches and will provide operation in the reseau mode and selective mode as options.

1.2 Activity of This Report Period

Fabrication and assembly of the deliverable Printer is now approximately 65% complete. The structural frame, roll-out drawers, drive modules, transport system, control console module, and air-bay assembly have all been mounted, aligned and doweled. The pneumatic systems for raising and lowering the air-bag mechanism and for the elevating idler roll are now installed. A power supply module is also complete and ready for installation.

Currently the Printer is being wired and the multiple-lamp assembly is being fabricated.

Remaining problems are fabrication of the printed-circuit modules for Automatic Exposure Control, and design of a device for sealing the roll-out drawers without making it difficult for the operator to open them. *Seems to be a little late!*

Binding frames for the Reseau and Clear Platens are now complete and are being assembled with their respective glass platens.

A meeting was held in Washington with the technical monitors on August 5, 1965 to review two designs for the Pre-View & Punch Station.

Conceptual drawings for the first design included an automatic film transport, a floor-model, styled cabinet, and electronically interlocked control functions. The second design, as shown in the Design Analysis, featured a simplified, table model, with manual film winding. [] recommended the first design, although some additional cost would be incurred.

On August 7, 1965 the technical monitors indicated by phone that the simplified version was preferred, and design has been initiated on this basis.

No written approval requested or given

The breadboard circuit for frame edge detection was tested in Washington by the technical monitors and the device was subsequently returned to [] New test data on both negative and positive frame separation densities which was forwarded to [] by the technical monitors, indicated that the breadboard unit operation, although satisfactory for most negatives, required frequent adjustment for various densities of positive materials encountered. On this basis, and after studying the typical density data furnished by the technical monitors, it has been concluded that the frame separation sensing design as originally conceived will not function reliably with the variable densities encountered between frames of positive film. A new design has been started employing

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Variable??

a density coincidence impulse circuit. Although initial design is encouraging, it is expected that additional time and costs above *Why so late?* that originally conceived will be incurred, due to the complex electronic design that is required.

1.3 Plans for Next Period

Fabrication and assembly of the deliverable printer will continue. Final check of the assembled reseau grid and binding frame will commence. Design and fabrication of the Pre-View & Punch Station will be continued. A new breadboard frame separation sensor will be fabricated for test. A request for an increase in contract amount and an extension of the delivery date will be submitted. *Was this the basis for the 31 Aug 65 letter?*

1.4 Problems

Frame separation sensing for positive materials is the outstanding problem at present. Approval of the test plan is required promptly *Our memo sent 29 Oct 65* so that design and fabrication of test materials can be initiated. A review of program status indicates that new complexities introduced by sensing of positive films may incur added costs and time.

1.5 Documentation

There was no new documentation this month.

1.6 Questions Outstanding

There are no outstanding questions this month.

2.0 HIGH RESOLUTION STEP AND REPEAT PRINTER

2.1 Purpose

The purpose of this effort is to design, fabricate, test and deliver in twenty months a high precision, step and repeat, photographic contact printer. This printer will be capable of producing photographic

contact prints of the highest possible quality, resolution, and acutance from roll films of width varying from 70 mm to 9-1/2" and in preselected frame lengths from 5 inches up to a maximum of 30 inches.

2.2 Activity of This Report Period

2.2.1 Exposure Control and Light Source

The power amplifier and fixed frequency oscillator was selected as the exposure source supply, and the pulse width modulator development has been discontinued. A variable gain driver amplifier has been designed and breadboarded and modulation of 500:1 was achieved. Low exposure source output level banding was successfully eliminated by the use of permanent magnets placed around the lamp. The log amplifier development has been completed, and the device functions as predicted. It is now ready for prototype fabrication.

Exposure control development is continuing on the breadboard printer and it is expected that film testing with the modulated light source will be initiated during the next period.

2.2.2 Film Gate and Scan Drive

Design modifications of the scan drive for widening the exposure range for slower films is underway. The most feasible design at present is a

speed controlled DC motor running continuously with electric clutches to drive the ball screw through the scan and return cycle. This type of motor control utilizes tachometer feedback to hold the speed constant to within $\pm 0.5\%$.

2.2.3 Vacuum Capstan

The capstan drive servo amplifier bench tests have been completed satisfactorily, and the design will be used in the prototype printer.

2.2.4 Film Transport

Bench simulation for the frame separation detector for negative film has been successfully completed. Investigations are being conducted to determine applicability to positive film input in accordance with the technical monitor's request. Drafting layout of the system has commenced and should be completed in another week. The system utilizes a GE 1874 tungsten lamp source, appropriate lenses, front surface mirrors, and a reflective mylar tape. This technique provides more reliable sensing than the fiber optic system described last month and will also eliminate the need for a moving probe.

The electronic portion of the capstan servo control has been installed into the breadboard, testing has

started, and performance of the deceleration function generator has been verified. The velocity servo and brake servo will be completed and installed into the breadboard during the next reporting period.

Dynamic film tension tests have been conducted, and the results verify that amplifier gain for the spool drive motor can be kept constant for all film widths and thicknesses.

2.2.5 Other Activities

Full scale layout and drafting for the deliverable printer has commenced in all areas. A conceptual design for electronic packaging, and a machine space study have been completed. The control panel human factors study and component layout and selection has also been concluded.

2.3 Plans for Next Report Period

Testing of the full scale breadboard will be continued. Drafting and procurement of components for the prototype will be accelerated. Photographic tests utilizing the breadboard simulated exposure control will be performed.

The proposed increase in scope caused by the revised specifications will be submitted.

2.4 Problems

Full dynamic operation of the exposing lamp has not yet been achieved. While the modulation range has been significantly improved, further

circuit modification and testing of the exposure control circuitry will be required.

2.5 Documentation

Although the range of voltage regulation at the government facility has not yet been furnished, it is felt at this time that the printer will operate satisfactorily over the range of 105 to 125 volts AC for each leg of the 4-wire three phase line.

If variations or surges beyond this range are expected this information should be sent to as soon as possible to prevent any further delays.

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*Was furnished
to on
2 Sep 65 mail to hq*

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